construct a two-dimensional simulation of said matter passing through said detection station, said detection medium comprising electromagnetic radiation which irradiates said section, said generating including determining the intensity of electromagnetic radiation of selected wavelength (s) received from portions of said stream distributed across said stream, and said determining being performed for each detection zone in respect of a plurality of wavelengths simultaneously.

REMARKS

Referring to the paragraphs of the Detailed Action:-

1. The Specification has been amended to follow the guidelines and bring the items (a) to (h) into the preferred layout and content.

2. The Abstract of the Disclosure is filed herewith.

3. Claims 151 through 154, 159 through 166 and 168 through 171 have been amended to correct their dependencies.

Claim 174 has been amended to give "said stream" proper antecedent basis.

4 and 5.

67. Although the Examiner states the claims 144, 145 and 174 are anticipated by EPO '221, he recites only some of the features of each claim, so it would seem from his own recital that he cannot show them to be anticipated.

In relation to claim 144, the features "scanning said section" and "said determining is performed for each detection zone in respect of a plurality of said wavelengths simultaneously" (underlining added for emphasis) are not disclosed in EPO '221. In fact, the reference does not appear to disclose any scanning of the transverse section of the stream at the station, but in fact instead refers, for example at lines 16 and 17 of column 4, to "simultaneously acquiring for the multiple items a group of separate measurements for each item". (underlining added for emphasis). In comparison with the method of the reference, the present method is less complex and more reliable. EPO '221 measures the amounts of penetrating electromagnetic

radiation passing through different portions of the matter to determine the composition of the matter but, as explained at lines 18 to 35 of column 1 of the reference, the results of this type of measurement are also dependent upon the thicknesses of the various portions of the matter, so that sorting of the matter by this means is unreliable in the sense of tending to give a relatively low degree of purity of the separated-out fraction. The advantage of performing the determining in respect of a plurality of wavelengths simultaneously is that this enable the present Applicants to determine the actual compositions of the portions of the matter much more reliably, so permitting a much higher degree of purity of a separated-out fraction to be obtained.

Therefore claim 144 is neither anticipated nor rendered obvious by the disclosure in EPO `221.

In regard to claim 145, although EPO `221 does refer to wavelengths of the radiation to be used, these are in general terms, such as at lines 18 to 22 of column 7, where it is stated that it is preferred to use wavelength which result in transmissions of 10% to 90% of incident radiation passing through the items to be separated. There is no disclosure whatsoever of the actual wavelengths used, as in claim 145, where it is stated the plurality of wavelengths comprise a plurality of wavelength bands in the region of 1.5 microns to 1.85 microns. Thus, claim 145 is clearly patentable for this reason and for the reasons given above in respect of claim 144.

Turning to claim 174, it is distinguished from the disclosure of EPO `221 in specifying "said station is a metal-detection station, said emitting means serves to emit electromagnetic field, and said receiving means comprises a multiplicity of electromagnetic field sensing devices arranged to be distributed across said stream". (underlining added for emphasis). Since the reference relies upon penetrating electromagnetic radiation, it cannot distinguish between, say, a stone and thin metal, so that its detection station cannot properly be described as a "metal-detection" station. Moreover, while its emitting means, such as the x-ray tube 11, emits electromagnetic radiation, it does not emit an electromagnetic field in the context of the present Specification nor do its sensing devices (15) serve to sense an electromagnetic field. The clear advantage of the apparatus of claim 174 over the disclosure in the reference is that the present apparatus can much more reliably

separate-out metal, so enabling a metal fraction of much higher purity to be separated-out.

Therefore claim 174 is neither anticipated nor rendered obvious by the disclosure in EPO '221.

8. Again, the Examiner has not in any way demonstrated anticipation since his recital again omits many features of the various claims.

Considering first the independent method claim, claim 172, it is distinguished from Castaneda in specifying "passing a second stream of matter through said detection station simultaneously with said first stream, emitting detection medium to be active at a transverse section of said second stream at said detection station wherein the later medium is varied by variations in the composition of matter of said second stream at the latter transverse section, and obtaining from said detection station second detection data as to a constituent of said second stream, and wherein the varied medium from both of the first and second streams is received by a receiving device common to both streams," (underlining added for emphasis).

The Examiner will note that Castaneda incorporates by reference United States Patent 4057146 (Castaneda et al.). It is clear from Castaneda when read in the light of Castaneda et al. that the sorting apparatus described with reference to the drawings thereof has six separate detection stations for the six separate streams, so that there is no disclosure of a detection station serving first and second streams, nor any disclosure of a varied-medium-receiving device common to both streams. In fact, in the reference, each stream has its own varied-medium-receiving device in the form of its own array of optical fibres 18 which receive the light reflected from the objects. A clear advantage of having a detection station serving a plurality of streams, with the detection station having a varied-medium-receiving device common to both streams is the very considerable cost saving thereby obtained.

Thus, claim 172 is neither anticipated nor rendered obvious by Castaneda.

Claim 148 as amended states that each of the streams should comprise "at its said transverse section...objects distributed across the stream." (underlining added for emphasis). It is clear from Castaneda that, at the transverse section of each of its streams, at which section reflection takes place, the stream has to be in the form of individual grains vertically separated fr m each other, so that claim 148 is distinguished from the reference by this feature and for the reasons given above in respect of claim 172. The feature of claim 148 has the advantage of requiring significantly less detection equipment for the same capacity of throughput of the sorting apparatus.

Turning to claim 149, the feature of this claim whereby the two streams are advanced in a common direction to the detection station has the advantage that a single conveyor, for example a conveyor belt, can carry both streams. Thus, claim 149 is patentable for this reason d for the reasons given in respect of claim 172.

As regards claim 173, it is patentable over Castaneda for the same reasons as claim 172.

Turning to claim 175, it is distinguished from Castaneda in specifying first and second advancing means serving to advance through the station the respective first and second streams. This has the advantage over Castaneda that the orientation of the first and second streams is not limited to being substantially vertical. Thus, claim 175 is patentable for that reason for the reasons given above in respect of claim 173.

In regard to claim 159, there is not disclosure whatsoever in Castaneda that a separated-cut fraction of one stream which has passed through a detection station should be transported by returning means back to a second advancing means upstream of that same station. The particular advantage of this arrangement is of permitting improvement of the degree of purity of the separated-out fraction. Thus claim 159 is patentable for these reasons and for the reasons given above in respect of claims 175 and 173.

10. It is respectfully pointed out to the Examiner that, rather than it being obvious to a person skilled in the art to modify the two streams of Castaneda to pass in opposite directions, it would be obvious to a person skilled in the art that this would

be totally impractical unless he were somehow to be able not only to have the first stream falling vertically with the grains at a vertical separation from each other, but also to have the second stream rising vertically with the grains at a vertical separation from each other. There is no suggestion in Castaneda that such a vertically upwardly directed machine gun arrangement should be provided. Claim 150 is clearly patentable for this reason and for the reasons given above in respect of claim 172.

11. As regards claims 156 to 158, these are patentable for the reasons given above in respect of claims 175 and 173.

Applicant is enclosing a Terminal Disclaimer Under 37 C. F .R. 1.321(b) to obviate a double patenting rejection over a prior patent. Enclosed is a check in the amount of $110.00 for the fee.

Applicant requests a one-month extension of time to respond to the outstanding Office Action. Enclosed is a check in the amount of $110.00 for the extension fee. Total amount is $220.00 check number 4253.

The Commissioner is authorized to charge any fee or credit any overpayment in connection with this communication to our Deposit Account No. 50-0852.

Respectfully submitted,

REISING, ETHINGTON, BARNES, KISSELLE,
LEARMAN & McCULLOCH, P.C.

Date: 4/5/01

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of Ulrichsen et al	)	Docket No.: P-340.3 Burrows
	)	Group Art Unit: 3653
Serial No.: 09/541,718	)	Examiner: T. Nguyen
Filed: April 3, 2000	)	
For: DETERMINATION OF CHARACTERISTICS OF MATERIAL	)	

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"EXPRESS MAIL" Mailing Label No. EL686018081US Date of Deposit April 5, 2001 I hereby certify that this paper or fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicted above and is addressed to the Assistant Commissioner for Patents, BOX PCT, Washington, D. C. 20231.

Patricia Priebe

Patricia Priebe

Assistant Commissioner For Patents
Washington, DC 20231

MARKED UP COPY OF AMENDMENT

Sir:

Pursuant to the requirements of 37 C.F.R. § 1.121(c)(ii), the following is a marked up copy being submitted in the accompanying AMENDMENT AND RESPONSE.

IN THE ABSTRACT:

Please add the following abstract.

ABSTRACT OF THE DISCLOSURE

A system for automatically inspecting matter for varying composition comprises one or more detection stations through which one or more streams of matter are advanced and particular materials therein are detected through their diffusely reflected IR spectra, if any, and/or through their variation of an electromagnetic field by their metallic portions, if any. A row of light sources distributed across the overall width of one or more belt conveyors may cause

desired portions of the stream to reflect light diffusely onto a part-toroidal mirr r extending over that overall width, whence the light is reflected, by a rotating, polygonal mirror through optical filters dedicated to differing IR wavelengths, nto detectors the data output of which is utilised in controlling sol noid valves operating air jet nozzles which separate-out the desired portions. Alternatively or additionally, an oscillator and an antenna which extends over that overall width generate an electromagnetic field through the belt and sensing coils sense variations therein produced by metallic portions of the stream passing through the detection station and the detection data produced by the sensing coils is used to control the solenoid valves operating the nozzles to separate-out the metallic portions.

IN THE TITLE:

Page 1, above line 1, inert the heading.

TITLE OF THE INVENTION

Page 1, between lines 1 and 2, insert the following.

CROSS-REFERENCES TO RELATED APPLICATIONS

This Application is a Divisional of our United States Patent Application Serial No. 08/776,689 filed as International Patent Application Serial No. PCT/1B95/00672 on August 2, 1995 and issued on 9 May 2000 as United States Patent Serial No. 6,060,677.

BACKGROUND OF THE INVENTION

1. FIELD OF THE INVENTION

Page 1, between lines 8 and 9, insert the following.

2. DESCRIPTION OF THE RELATED ART INCLUDING INFORMATION DISCLOSED UNDER 37CFR 1.97 AND 1.98

Amend page 5, line 3, and line 5 as follows.

US-A-5260576 [discloses] and EP-A-484,221 disclose a method and apparatus for distinguishing and separating material items having different levels of absorption of [pentrating] penetrating electromagnetic radiation by utilising a source of radiation for irradiating an irradiation zone extending transversely of a feed path over which the material items are fed or passed. The irradiation zone includes a plurality of transversely spaced radiation detectors for receiving the radiation beams from the radiation source. The material items pass through the irradiation zone between the radiation source and the detectors and the detectors measure one or more of the transmitted beams in each item passing through the irradiation zone to produce processing signals which are analyzed by signal analyzers to produce signals for actuating a separator device in order to discharge the irradiated items toward different locations depending upon the level of radiation absorption in each of the items. The disclosure states that mixtures containing metals, plastic, textiles, paper and/or other such waste materials can be separated since penetrating electromagnetic radiation typically passes through the items of different materials to differing degrees, examples given being the separation of aluminum beverage cans from mixtures containing such cans and plastic containers and the separation of chlorinated plastics from a municipal solid waste mixture. The source of penetrating radiation may be an X-ray source, a microwave source, a radioactive substance which emits gamma rays, or a source of UV energy, IR energy or visible light. One example of material items which are disclosed as having been successfully separated are recyclable plastic containers, such as polyester containers and polyvinyl chloride (PVC) containers, which were separated using X-rays.

Page 6, between lines 14 and 15, insert the following paragraph.

US-A-4718559 discloses selective non-magnetic detection of non-ferrous metallic particles in a mixture of the same with ferrous metallic particles and non-metallic particles and non-metallic particles derived from homogenised and

magnetically treated municipal or like waste by a plurality of electronic detectors and separation of a non-ferrous metallic concentrate from the mixture. In the process, the waste particles, agglomerates or vicinity f detector coils in ass ciation with an electronic activation system which activates a particle remover, preferably pneumatic. The remover may be made up of an air supply line which conducts air to an air valve and jet-type spray unit which causes most of the non-ferrous metallic particles to fall into or onto a non-metallic residue conveyor, which is separated from a metallic concentrate conveyor by a partition.

Page 6, between lines 26 and 27 insert the following paragraph.

US-A-4718558 and US-A-4057146 incorporated therein by reference disclose apparatus for optically sorting small lightweight objects such as beans and/or grains on the basis of size and colour. The small objects pass through the apparatus in a plurality of separate streams, each stream being fed from its own hopper to its own control gate to its own vibrating try and thence, through its own vertically positioned channel, to arrive at its own analysis head. Each analysis head is in the form of an annulus with the central opening directly beneath the outlet end of the corresponding channel and the small objects in the corresponding stream fall down through its central opening one after another with vertical separation therebetween. Illumination is supplied by a plurality of illuminating lamps. For each analysis head, the light reflected from it particular stream is conveyed to a plurality of photodetectors of that head. The reflected light is conveyed to that plurality of photodetectors by a plurality of optical fibres of the analysis head. A solenoid-operated compressed air valve is opened when an object in the stream is to be rejected into a rejection hopper; otherwise, the valve remains closed and the objects fall directly into an acceptance hopper. It appears that analysis circuits for the respective streams are housed in a common control unit having a control panel which displays information and allows an operator to control the apparatus, including the setting of parameters.

Page 7, between lines 6 and 7, insert the following paragraph.

US-A-6068106 discl ses a unit for conveying products and having a main conveying device in the form of a belt conveyor; two secondary c nveying deices for feeding respective streams of products to the main conveying devic via respective inputs; and a distributing device for so controlling the two streams that the products in a first of the two streams, on reaching an output of the main conveying device, are offset with respect to the products in a second of the two streams, so as to form a single succession of products through the output. The two inputs are separated by a vertical partition extending towards the location where the two streams are combined.

Page 13, line 31, insert the following.

BRIEF SUMMARY OF THE INVENTION

Amend page 13, line 37, as follows.

According to a seventh aspect of the present invention, there is provided a method of automatically inspecting matter for varying composition, comprising advancing through a detection station a first stream of matter, emitting detection medium to be active at a transverse section of said stream at said detection station, wherein said medium is [carried] varied by variations in the composition of said matter at said transverse section, obtaining from said detection station first detection data as to a constituent of said first stream, characterised by advancing a second stream of matter through said detection station simultaneously with said first stream, emitting detection medium to be active at a transverse section of said second stream at said detection station, wherein the latter medium is varied by variations in the composition of matter of said second stream at the latter transverse section, and obtaining from said detection station second detection data as to a constituent of said second stream, and also characterised in that the varied medium from both of the first and second streams is received by a receiving device common to both streams.

Page 14, between lines 5 and 6, insert the following.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

Page 14, between 39 and 40, insert the following.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS OF THE INVENTION

IN THE CLAIMS:

Please amend claims 144, 148, 151, 153, 154, 160, 162, 166, 168-174 so that they read as follows.

144. (Amended) A method of automatically inspecting matter for varying composition, comprising advancing a stream of said matter through a detection station, irradiating with electromagnetic radiation comprising **[substantially invisible]** electromagnetic radiation a section of said stream at said station, scanning said section and determining the intensity of **[substantially invisible]** electromagnetic radiation of selected wavelength(s) received from portions of said stream, and obtaining detection data from said detection station, wherein said scanning is performed in respect of a plurality of discrete detection zones distributed across said stream and said determining is performed for each detection zone in respect of a plurality of said wavelengths simultaneously.

148. (Amended) A method according to claim 147, wherein each of the first and second streams **at its said transverse section** comprises objects distributed across the stream.

151. (Amended) A method according to claim [147] **172**, and further comprising utilising the first and second detection data to separate from the respective first and second streams respective first and second fractions comprised of said constituent of said first stream and said constituent of said second stream, respectively.

153. (Amended) A method according to claim [147] **172**, wherein said constituent of said first stream is of substantially the same composition as said constituent of said second stream.

154. (Amended) A method according to claim [147] 172, wherein said constituent of said first stream is of significantly different composition from said constituent of said second stream.

160. (Amended) Apparatus according to claim [155] 175, wherein the first and second emitting means are so arranged as to extend across both of the first and second streams.

162. (Amended) Apparatus according to claim [155] 175, wherein said receiving device is so arranged as to extend across both of the first and second streams.

166. (Amended) Apparatus according to claim [155] 175, wherein said receiving device comprises a multiplicity of metal-sensing means arranged so as to be discretely distributed across the first and second streams and serving to detect metal portions constituting the constituent (s) of at least one of the first and second streams.

168. (Amended) Apparatus according to claim [167] 174, wherein said emitting means which serves to generate an electromagnetic field comprises an antenna extending across said advancing means at said metal-detection station.

169. (Amended) Apparatus according to claim [167] 174 or 168, wherein said advancing means is situated between said emitting means and said receiving means for the field.

170. (Amended) Apparatus according to claim [167] 174, wherein said emitting means is connected to an oscillator, whereby said electromagnetic field oscillates, and wherein said sensing devices are electromagnetic field frequency sensing devices.

171. (Amended) Apparatus according to claim [167] 174, wherein said data-obtaining means serves to construct from the detection data from said electromagnetic

field sensing devices a two-dimensional simulation of said matter passing through said detection stati n.

172. (Amended) A method of automatically inspecting matter for varying composition, comprising passing through a detection station a first stream of matter, emitting detection medium to be active at a transverse section of said stream at said detection station, wherein sad medium is varied by variations in the composition of said matter at said transverse section, obtaining from said detection station first detection data as to constituent of said first stream, passing a second stream of matter through said detection station simultaneously with said first stream, emitting detection medium to be active at a transverse section of said second stream at said detection station wherein the latter medium is varied by variations in the composition of matter of said second stream at the latter transverse section, and obtaining from said detection station second detection data as to a constituent of said second stream, and wherein the varied medium from both of the first and second [stream] **streams** is received by a receiving device common to both streams.

174. (Amended) A method of automatically inspecting **a stream of** matter for varying composition, comprising A method of automatically inspecting matter for varying composition, comprising which said stream passes, emitting means serving to emit a detection medium to be active at a transverse section of said stream at said station, receiving means at said station arranged to extend physically across substantially the width of said stream serving to receive detection medium varied by variations in the composition of said matter at said section, detecting means arranged to be in communication with said receiving means and serving to generate detection data in dependence upon the variations in said medium, and data-obtaining means connected to said detecting means and serving to obtain said detection data therefrom, wherein said station is a metal-detection [stations] **station**, said emitting means serves to emit electromagnetic field, and said receiving means comprises a multiplicity of electromagnetic field sensing devices arranged to be distributed across said stream.

Add claim 176 as follows:

176. A method of automatically inspecting matter for varying composition, comprising passing a stream of said matter through a detection station, emitting a detection medium to be active at a transverse section of said stream at said detection station, wherein said medium is varied by variations in the composition of said matter at said transverse section, receiving the varied medium from over substantially the width of the steam at a receiving device, and generating detection data in dependence upon the variations in said medium, wherein said transverse section comprises a multiplicity of individual detection zones distributed across substantially the width of said stream, and the detection data from said individual detection zones is used to construct a two-dimensional simulation of said matter passing through said detection station, said detection medium comprising electromagnetic radiation which irradiates said section, said generating including determining the intensity of electromagnetic radiation of selected wavelength (s) received from portions of said stream distributed across said stream, and said determining being performed for each detection zone in respect of a plurality of wavelengths simultaneously.

Respectfully submitted,

REISING, ETHINGTON, BARNES, KISSELLE, LEARMAN & McCULLOCH, P.C.

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